

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

YASUDA et al.

Art Unit: Unassigned

Application No. Unassigned

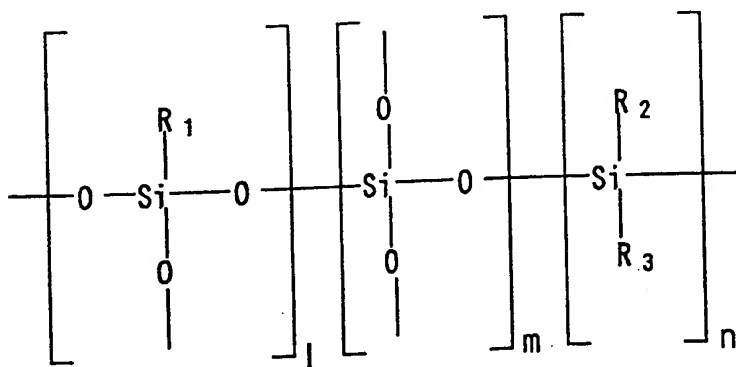
Examiner: Unassigned

Filed: January 10, 2002

For: SENSOR ELEMENT AND METHOD  
OF FABRICATING THEREOF

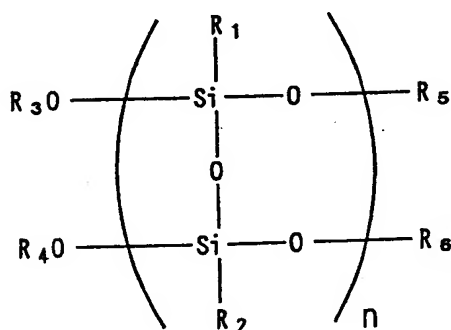
**PENDING CLAIMS AFTER ENTRY OF PRELIMINARY AMENDMENT**

1. A sensor element comprising:  
sensor substrate;  
a sensing portion supported by the sensor substrate; and  
a resin film between the sensor substrate and the sensing portion.
2. The sensor element according to claim 1, wherein the sensing portion has a  
microfine wiring pattern.
3. The sensor element according to claim 2, wherein the microfine wiring pattern  
comprises plural wiring patterns adjacent each other.
4. The sensor element according to claim 1, wherein the resin film is a cured polymer  
film selected from the group consisting of silicone polymers, polyimide polymers, polyimide  
silicone polymers, polyarylene ether polymers, bisbenzocyclobutene polymers,  
polyquinoline, perfluorohydrocarbon, fluorocarbon polymers, and aromatic hydrocarbon  
polymers.
5. The sensor element according to claim 4, wherein the polymer is a photo-curing  
polymer.
6. The sensor element according to claim 1, wherein the cured polymer film is a  
silicone polymer represented by the general formula (1)



wherein  $R_1$ ,  $R_2$ , and  $R_3$  may be the same or different, are selected from the group consisting of an aryl group, a hydrogen atom, an aliphatic alkyl group, a hydroxyl group, a trialkylsilyl group, and a functional group having an unsaturated bond, 1, m, and n are integers and at least 0, and the silicone polymer has a weight-average molecular weight of not less than 1,000.

7. The sensor element according to claim 1, wherein the resin film is a cured film of a silicone polymer represented by the general formula



wherein  $R_1$  and  $R_2$  may be same or different, and are selected from the group consisting of an aryl group, a hydrogen atom, an aliphatic alkyl group, and a functional group having an unsaturated bond,  $R_3$ ,  $R_4$ ,  $R_5$ , and  $R_6$  may be same or different, and are selected from the group consisting of a hydrogen atom, an aryl group, an aliphatic alkyl group, a trialkylsilyl group, and a functional group having an unsaturated bond, and n is an integer, and the silicone polymer has a weight-average molecular weight of not less than 1,000.

8. The sensor element according to claim 4, wherein the resin film comprises plural layers and each of the layers comprises a cured polymer film of a different cured polymer.

9. The sensor element according to claim 8, wherein each of the layers comprises a cured polymer having different molecular weight.

10. The sensor element according to claim 9, wherein the layers include a layer of a cured polymer film comprising a silicone polymer having a weight-average molecular weight of not less than 100,000 and a layer of a cured polymer film comprising a silicone polymer having a weight-average molecular weight of not more than 100,000.

11. The sensor element according to claim 8, wherein an uppermost layer of the layers comprises a cured polymer film of a photo-curing polymer.

12. The sensor element according to claim 1, wherein the sensor element is selected from the group consisting of a magnetoresistance sensor, an air flow sensor, an acceleration sensor, a pressure sensor, a yaw rate sensor, and an image sensor.

13. A method of fabricating a sensor element, comprising:  
applying a solution including a thermosetting polymer to a sensor substrate to form a polymer film;

heating the polymer film to a temperature not lower than a fusing temperature and lower than a curing temperature of the thermosetting polymer;

heating the polymer film to a temperature not lower than the curing temperature to cure the resin film; and forming a sensor element on the resin film after curing of the resin film.

14. The method of fabricating a sensor element according to claim 13, wherein the thermosetting polymer is selected from the group consisting of a silicone polymer, a polyimide polymer, a polyimide silicone polymer, a polyarylene ether polymer, a bisbenzocyclobutene polymer, a polyquinoline polymer, a perfluorohydrocarbon polymer, a fluorocarbon polymer, and an aromatic hydrocarbon polymer.